Update on CDF Beam Width Measurements

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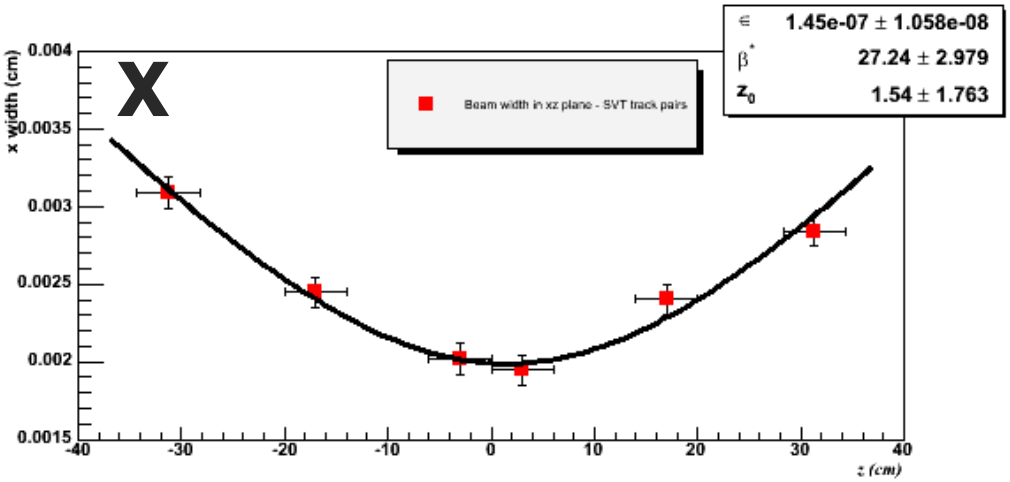
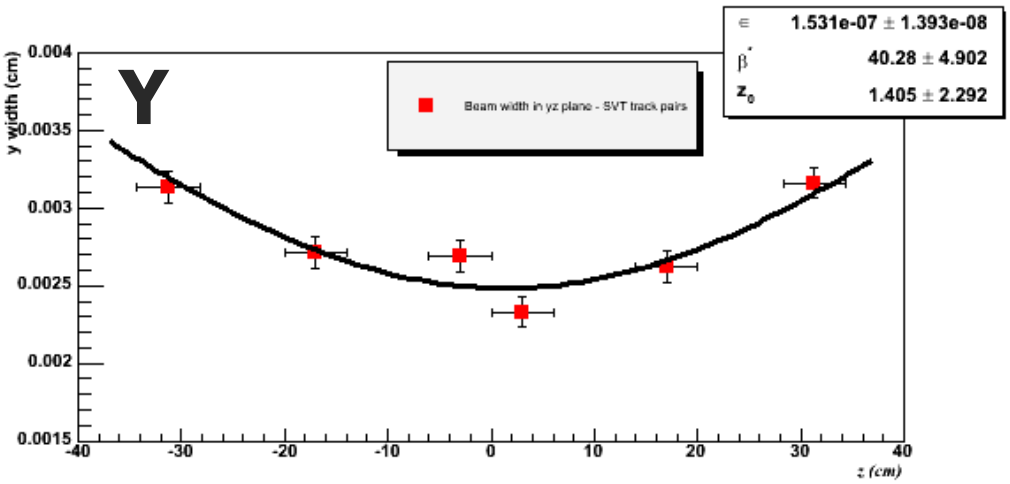
Online Measurement

I'm just getting started to work on beam widths measurement… so bear with me.

Store 4318

- The beam width comes from trigger track pairs in each silicon detector half-barrel.
- There are six half-barrels in z => crude profile measurement
- Consider track pairs 100 min. after Silicon turned on.
  - need to wait for beam position (5min)
  - arbitrary choice of 100min into store



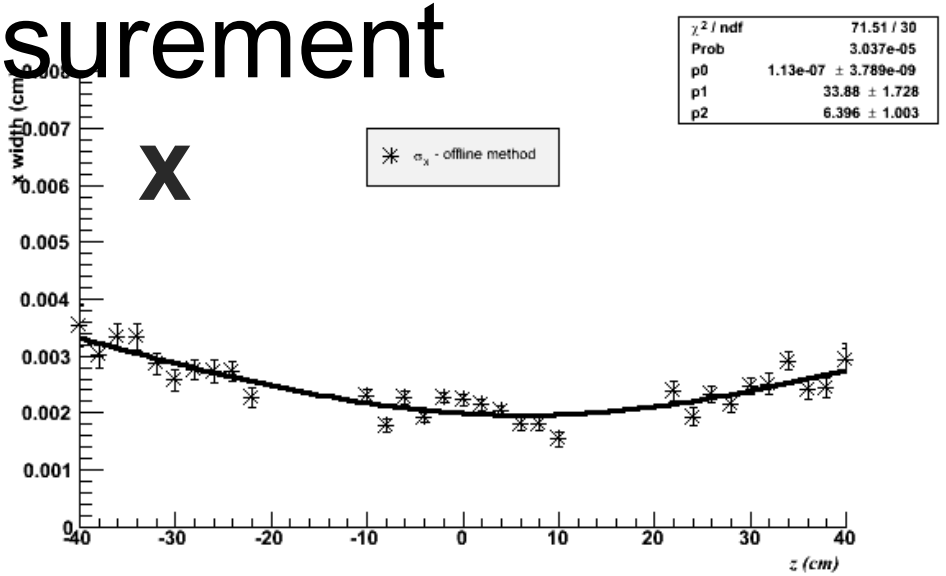


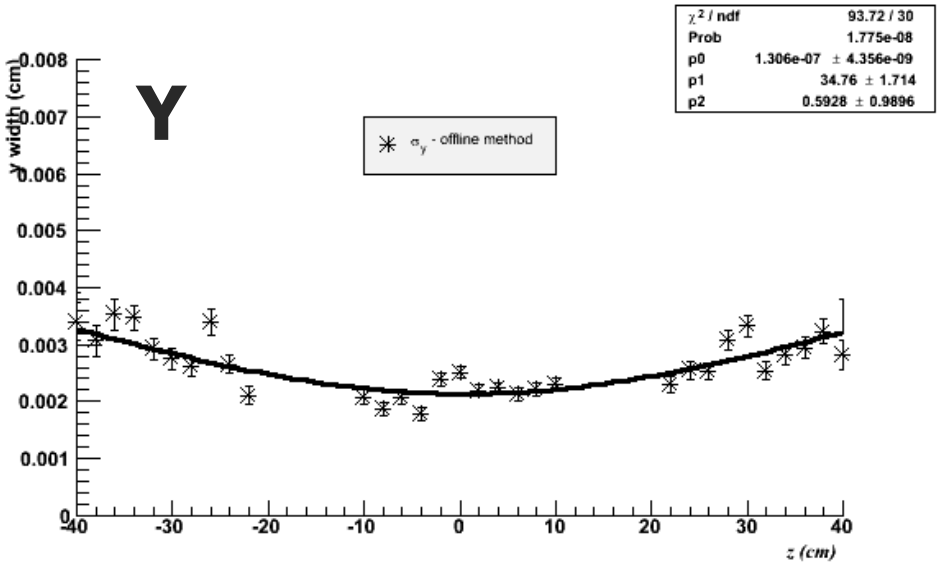
Offline Measurement

Store 4318

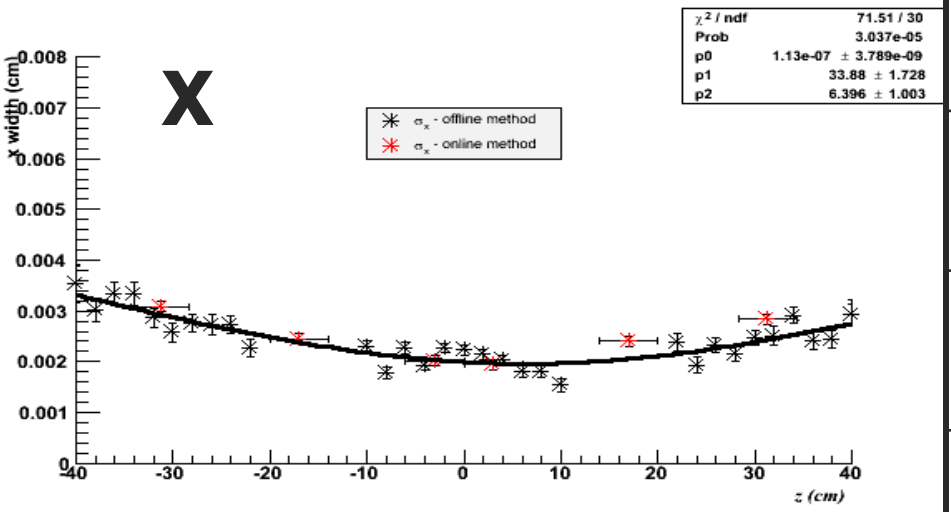
- This store is the latest store we can get from cdf data.

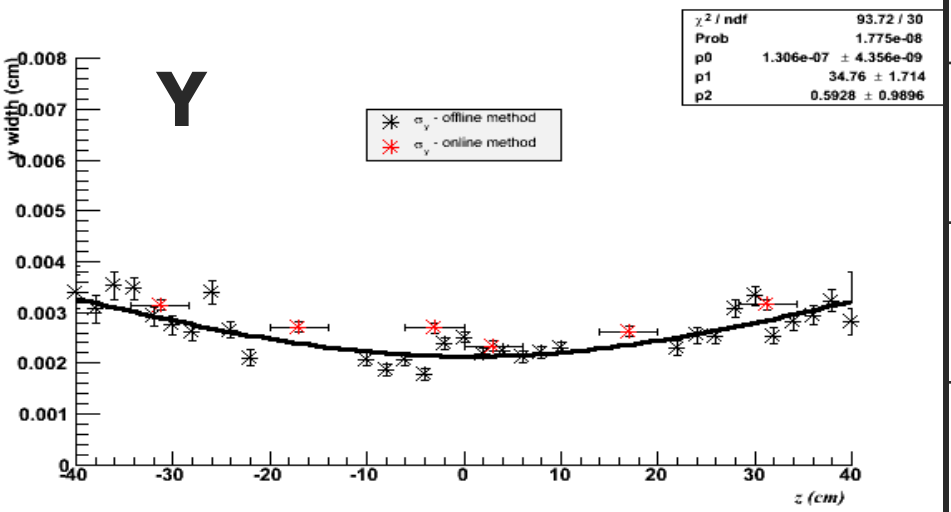
- The beam width came from reconstructed primary vertex distribution.





Comparison between On/Off-line Measurement

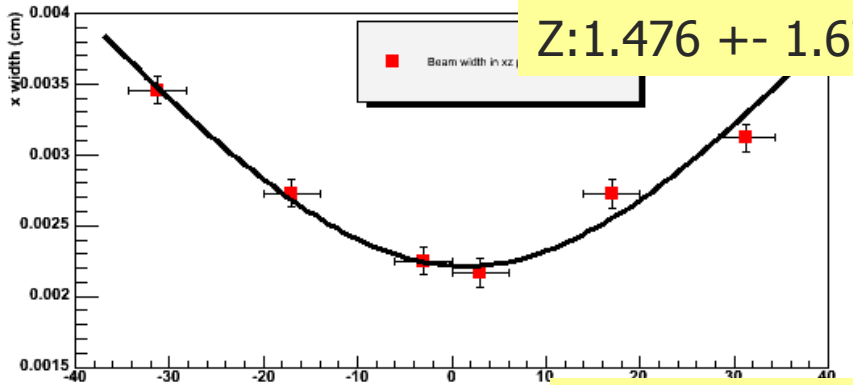




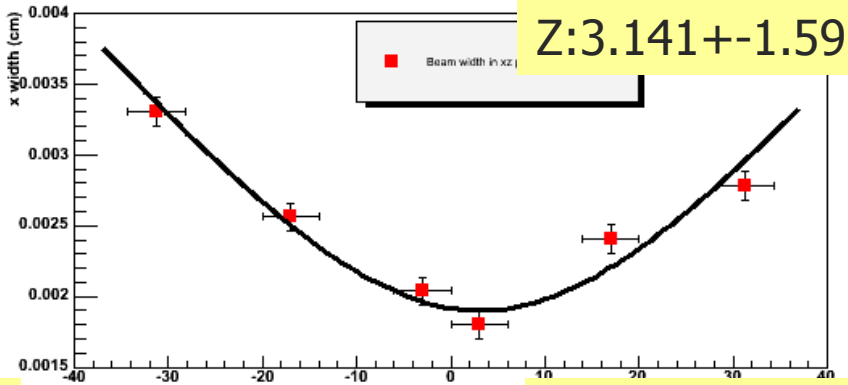
	Online	Offline
b*_x	27.24 +-2.979	33.88 +-1.728
e_x	1.45e-7 +-1.06e-8	1.13e-7 +-3.79e-9
z0_x	1.54 +-1.763	6.396 +-1.003
b*_y	40.28 +-4.902	34.76 +-1.714
e_y	1.531e-7 +-1.39e-8	1.306e-7 +-4.36e-9
z0_y	1.405 +-2.292	0.5928 +-0.99

Before/After beam optics movement (2005.9.20)

E:1.8e-7+- 1.3e-8
B:27.06 +- 2.81
Z:1.476 +- 1.672

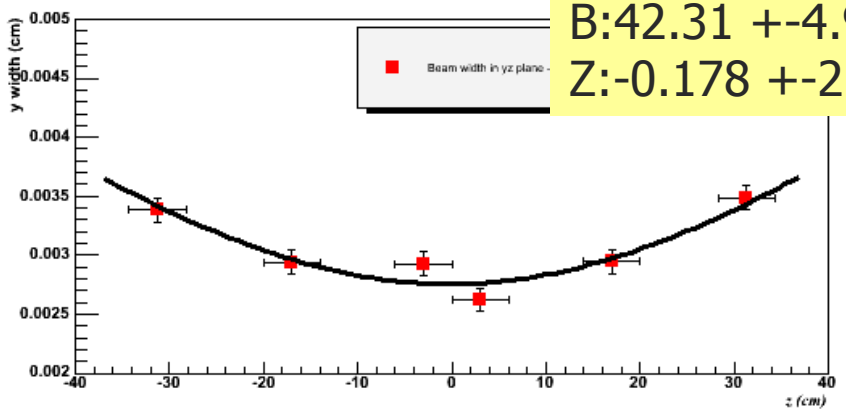


E:1.5e-7+-1.1e-8
B:23.5+-2.62
Z:3.141+-1.59



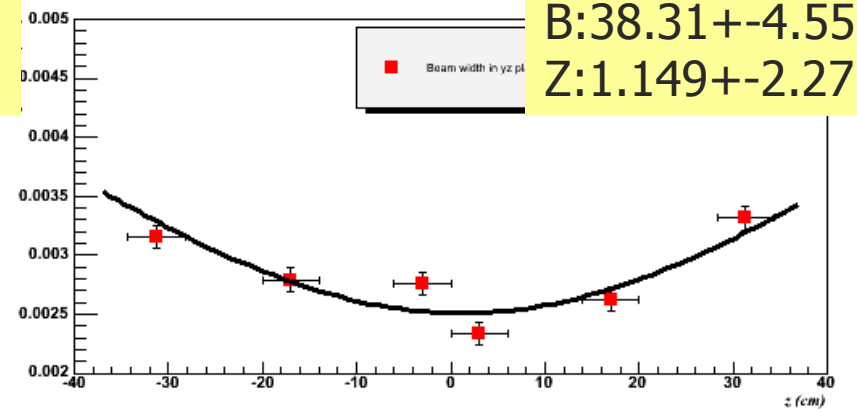
X

E:1.8e-7+-1.6e-8
B:42.31 +-4.93
Z:-0.178 +-2.28



Y

E:1.6e-7+-1.4e-8
B:38.31+-4.55
Z:1.149+-2.27

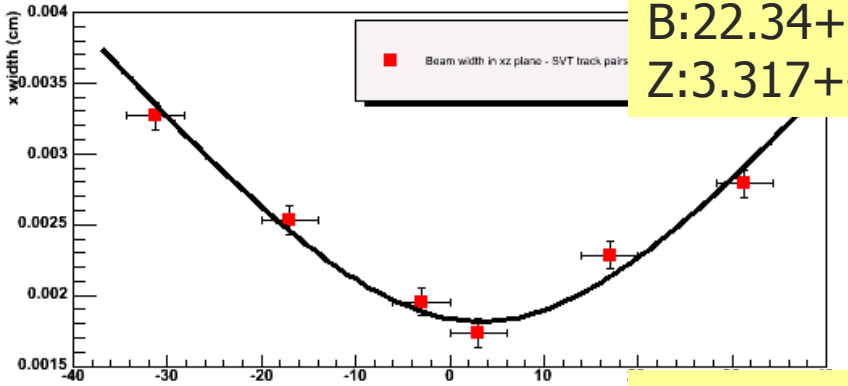


Store 4392

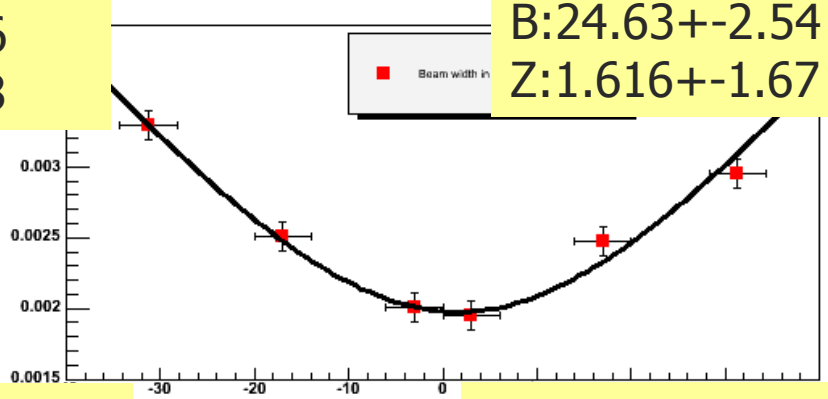
Store 4395

Before/After Z0 movement (2005.10.27)

E:1.48e-7+-1.0e-8
B:22.34+-2.46
Z:3.317+-1.58

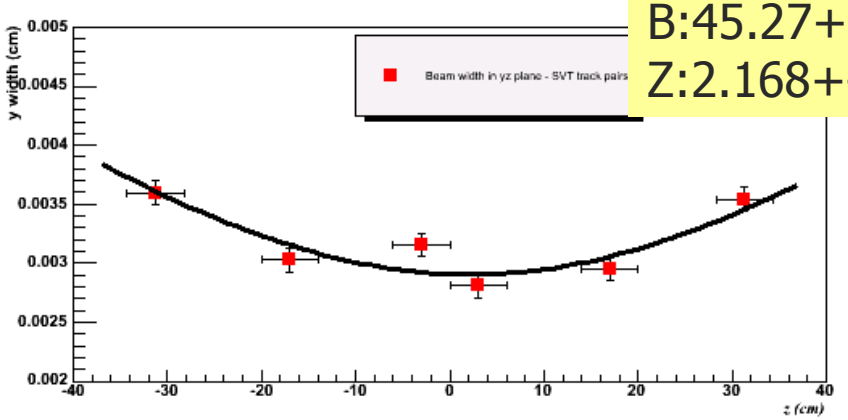


E:1.59e-7+-1.1e-8
B:24.63+-2.54
Z:1.616+-1.67

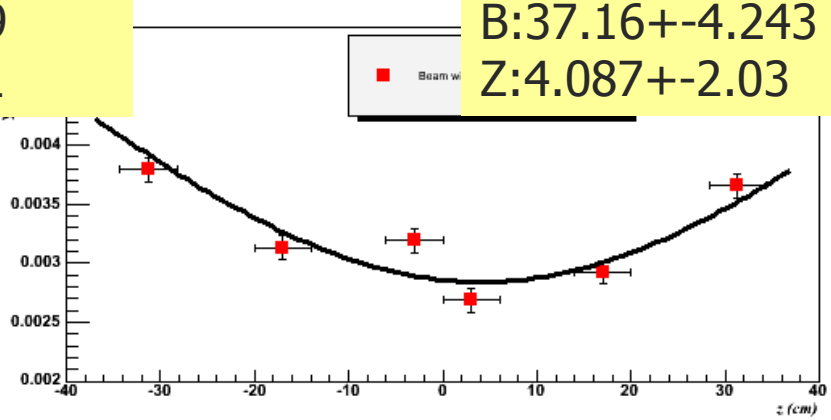


X

E:1.86e-7+-1.7e-8
B:45.27+-5.29
Z:2.168+-2.41



E:2.171e-7+-1.8e-8
B:37.16+-4.243
Z:4.087+-2.03



Y

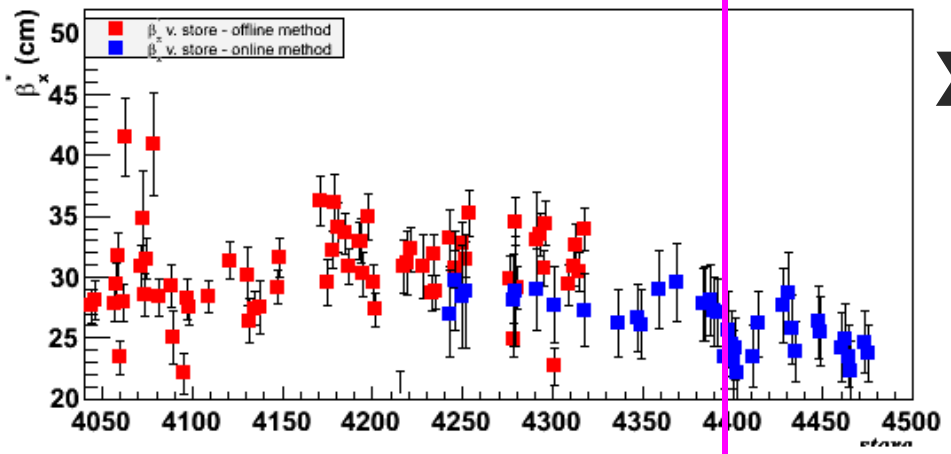
Store 4465

Store 4473

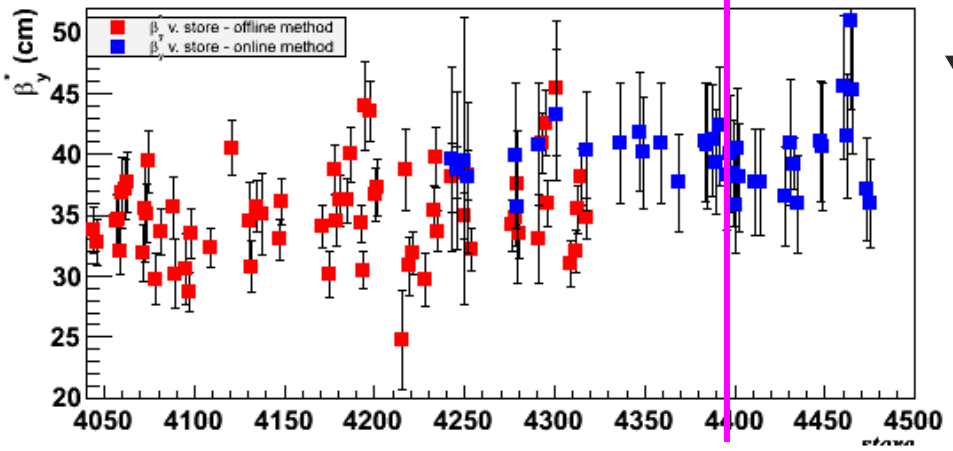
Beta* History

Beam Optics Moving

Offline (~4318)
Online (~4475)



X

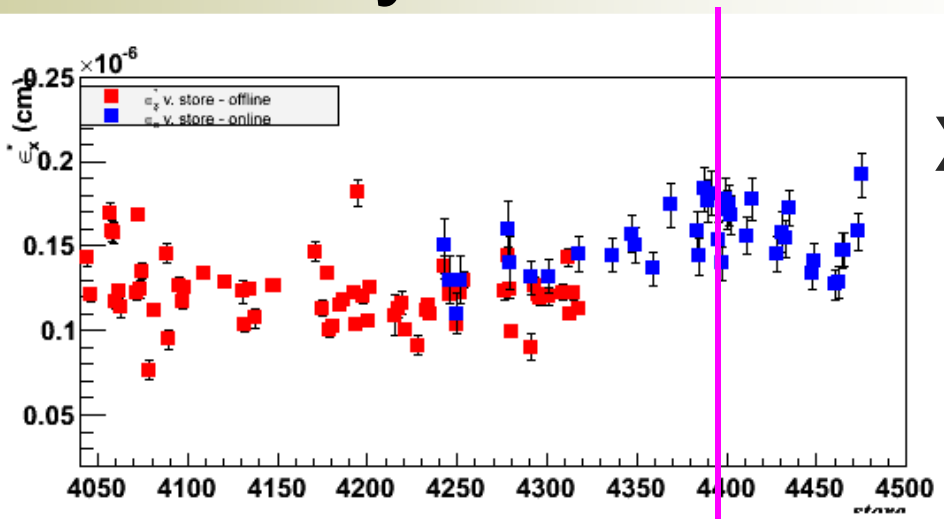


Y

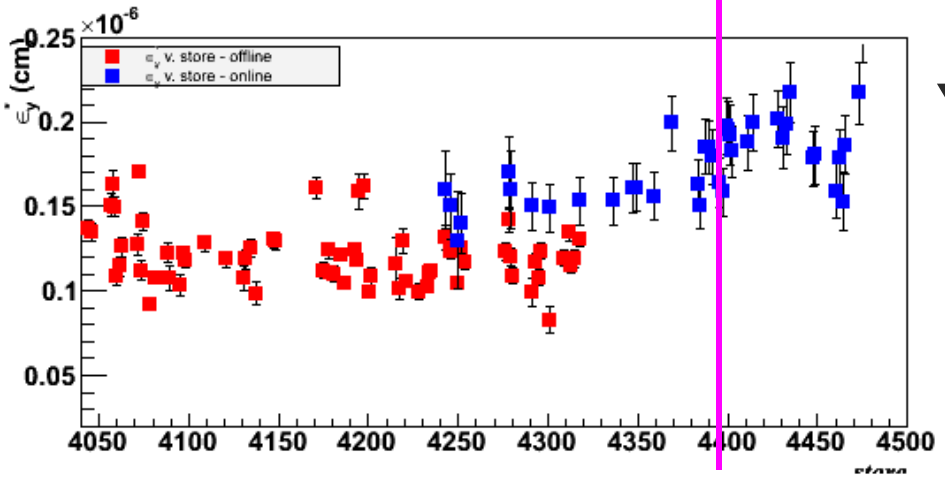
Emittance History

Beam Optics Moving

Offline (~4318)
Online (~4475)



X

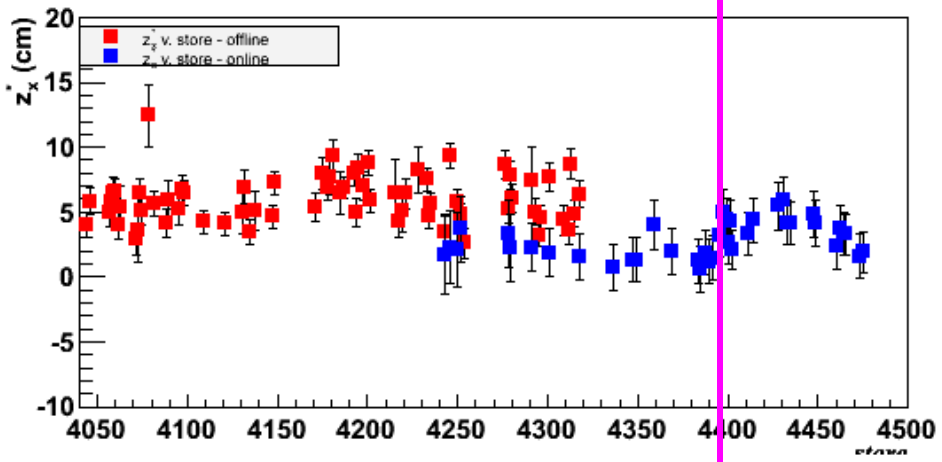


Y

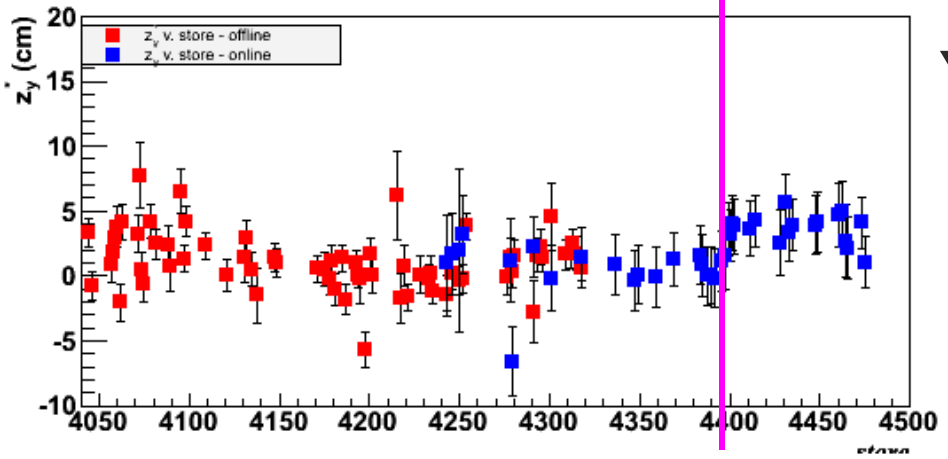
Z0 History

Beam Optics Moving

Offline (~4318)
Online (~4475)



X



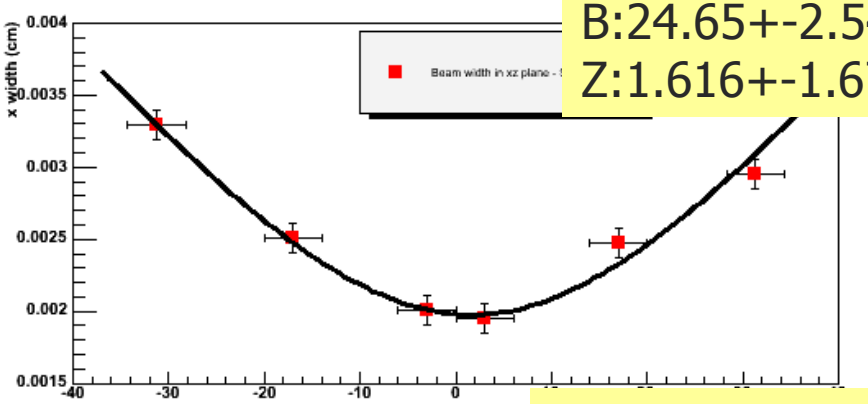
Y

Z distribution study

- Profile measurement relies on knowing average z position of all track pairs in each half-barrel
- Up till now this was estimated from raw SVT track distributions
- Need to check if this is indeed okay
- But it is not so easy – events passing L3 trigger sculpt the z dist
- Now studying z dist from JET data and ttbar MC events to see if old template is accurate
  - But these events are sculpting the z dist as well
  - Will look at a more inclusive track sample that is not sculpting the z distribution
- We will get our hands on the raw tracks and get this understood

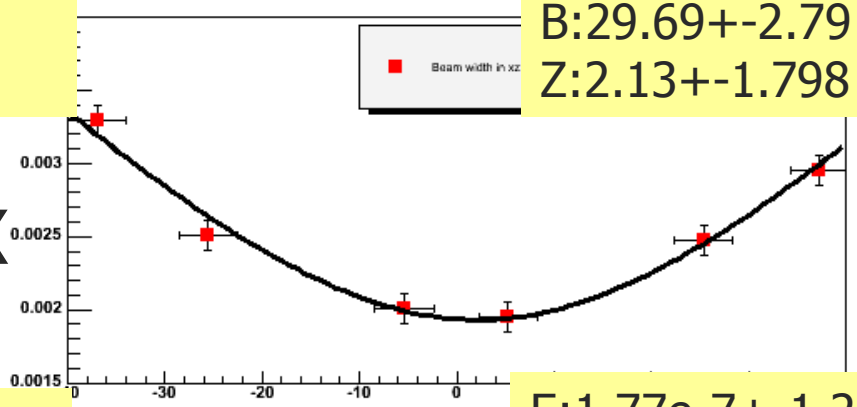
Z distribution study(store4373)

E:1.59e-7+-1.1e-8
B:24.65+-2.54
Z:1.616+-1.67

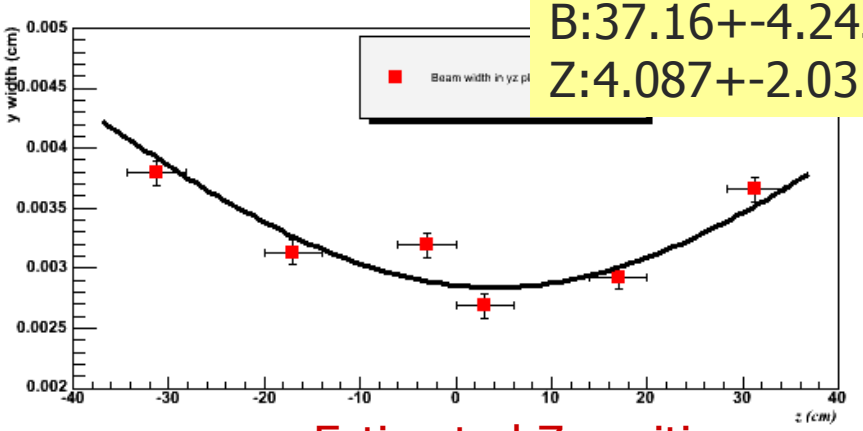


E:1.26e-7+-7.2e-9
B:29.69+-2.79
Z:2.13+-1.798

X

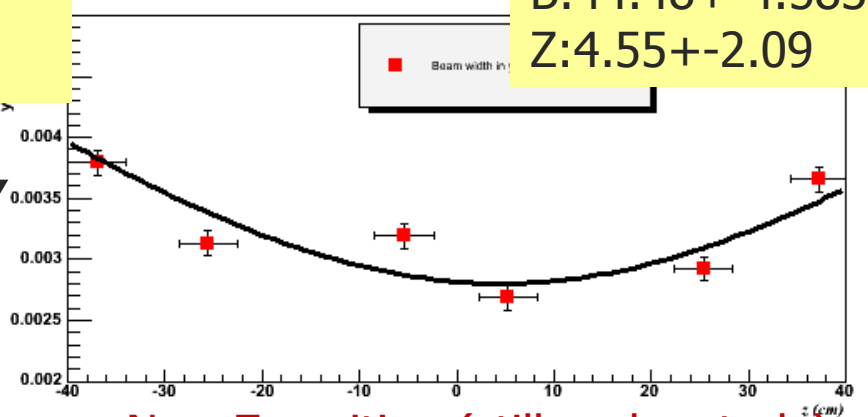


E:2.171e-7+-1.8e-8
B:37.16+-4.243
Z:4.087+-2.03



E:1.77e-7+-1.25e-8
B:44.48+-4.583
Z:4.55+-2.09

Y



Estimated Z position

New Z position (still under study)

Summary

- On/off-line beam measurement system is well established.
- The history plot shows a disagreement between on/off-line measurement method.
  - The work to have accurate z position of silicon barrel (online) is important and is in progress.
- Next things to study:
  - Barrel 2 – beta*_y always outlier??
  - Reduce stat errors – a few ideas
  - Record this info in CDF data stream